

3 PAGE FLOATING POINT PACKAGE WITH FLOATING OUTPUT

DECUS Program Library Write-up

DECUS No. 8-375B

This write-up describes a 3 Page Floating Point Package whose distinguishing characteristic is that in 3 words it packs 27 bits.

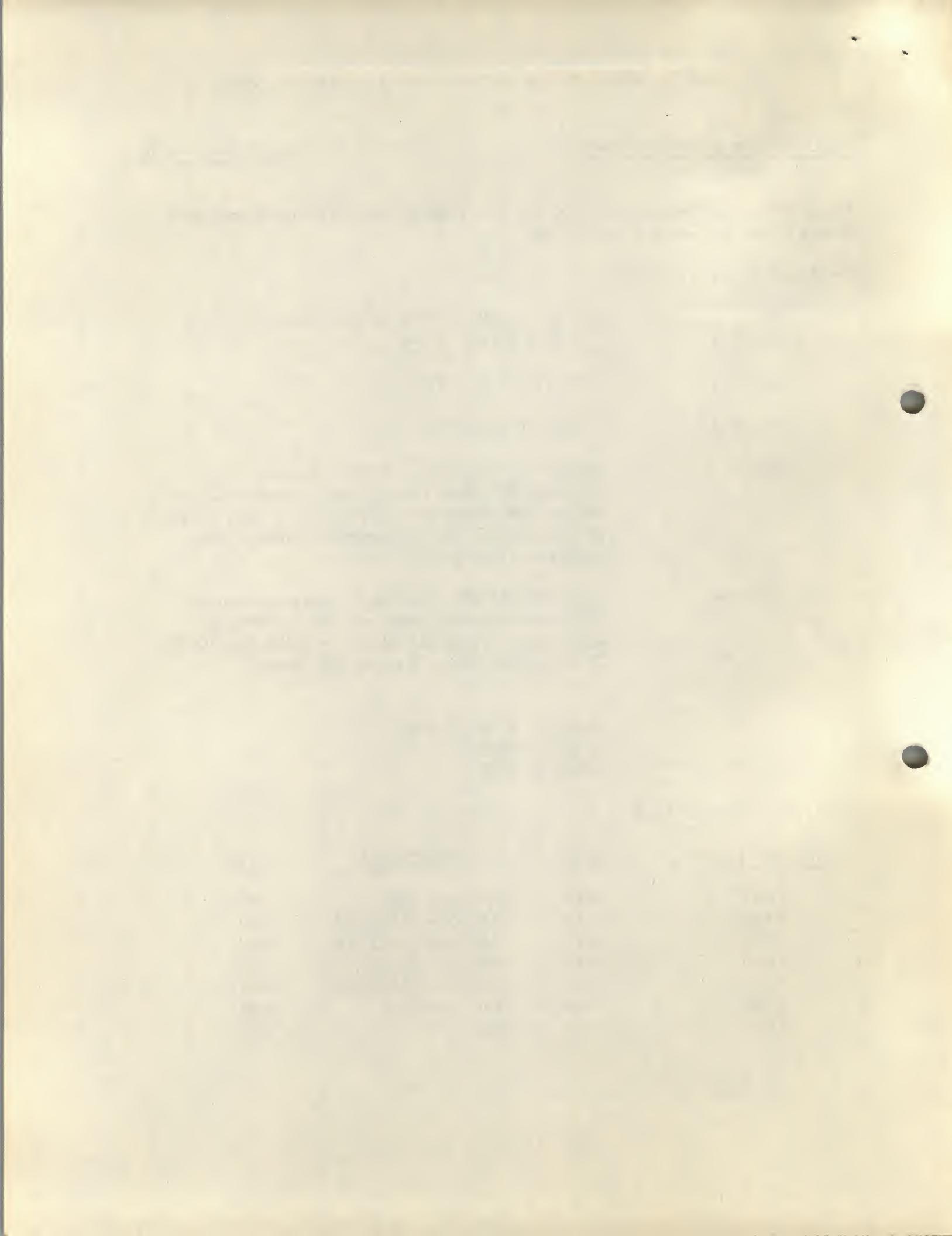
The 3 word format is as follows:

	SM EXCESS 2 ⁰⁰ EXPONENT MANTISSA
WORD 1	0 0 0 0 0 0 0 0 0 0 0 0
WORD 2	0 0 0 0 0 0 0 0 0 0 0 0
WORD 3	0 0 0 0 0 0 0 0 0 0 0 0
SM	-SIGN OF MANTISSA. IF SM=1 then the # is CONSIDERED NEGATIVE; IF SM=0 then it is POSITIVE. The Mantissa is always in POSITIVE form, only the SIGN Bit indicates the sign. To negate a number, simply complement the sign bit.
Exponent	- It is EXCESS 2 ⁰⁰ , meaning the exponent is always 2 ⁰⁰ + the true binary exponent. For example, 2, which in floating point binary is the following .10000 x 2 ² is stored as follows in excess 2 ⁰⁰ format:

WORD 1: 2024 (SM=0.)
WORD 2: 0000
WORD 3: 0000

FLOATING INSTRUCTIONS

INSTRUCTION	CODE	FUNCTION	TYPE
FGET	0XXX	(FAC)<—(EA)	MRI
FADD	1XXX	(FAC)<—(FAC)+(EA)	MRI
FSUB	2XXX	(FAC)<—(FAC)-(EA)	MRI
FMUL	2XXX	(FAC)<—(FAC)x(EA)	MRI
FDIV	4XXX	(FAC)<—(FAC)÷(EA)	MRI
FJMP	5XXX	FPC <—(EA)	MRI
FPUT	7XXX	(EA) <—(FAC)	MRI



FEXT	0000	LEAVE INTERPRETOR
FNOR	6000	NORMALIZE FAC
FSKP	6600	SKIP NEXT INST
FSNE	6640	SKIP NEXT IF (FAC) \neq 0
FSEQ	6650	SKIP NEXT IF (FAC)=0
FSGE	6700	SKIP NEXT IF (FAC)>0
FSLT	6710	SKIP NEXT IF (FAC)<0
FSGT	6640	SKIP NEXT IF (FAC)>0
FSLE	6750	SKIP NEXT IF (FAC)<0

NOTE:

FAC	-Floating AC
(FAC)	-Contents of Floating AC.
EA	-Effective Address
(EA)	-Contents of effective address
FPC	-Floating PC.

For core usage a listing should be referred to. In case of an error, the package HALTS. This can be fed by simply re-assigning the symbol ERROR to something more useful.

This package was written by Mark Bramhall, but arranged into a stand-alone package by Richard Rothman.

No floating I/O is contained in this package.

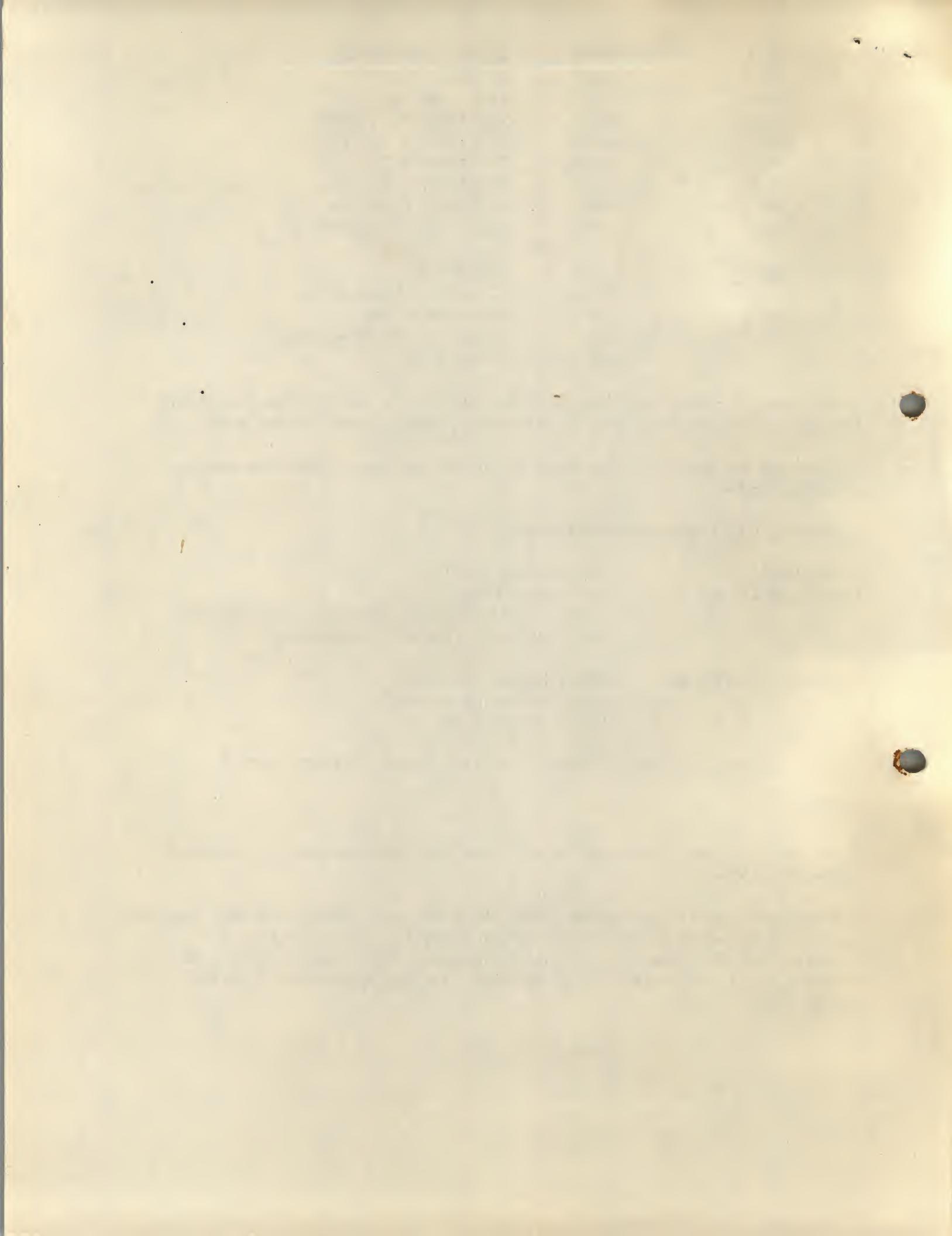
CORE USAGE 50 - 64, 5400 - 6177
 ERROR LOCATION: 5525, 6046, 6064
 THESE CONTAIN HALTS. THEY CAN BE PATCHED
 TO SOMETHING ELSE OR REASSEMBLED

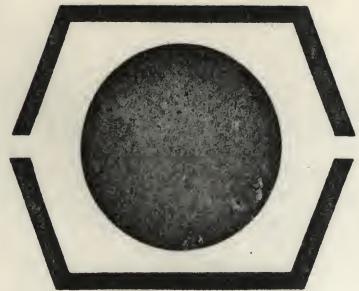
MEANING OF ERROR: 5525 - Exponent overflow
 6046 - Exponent underflow
 6064 - Division by 0.

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If this version is used, core usage, in addition to that mentioned above is: 6200-6377, 6400-6501, 6566-6577.

Floating point output is unformatted. Seven digits are typed. The seventh digit is rounded up from the 8th (which is not printed). Format of output is: $\pm X.\text{XXXXXXXXE}+XX$ or $\pm X.\text{XXXXXXXXE}-XX$. When calling this routine internally, the FAC should contain the #. A JMS is made to location 6200. On return the # has been typed (no CR's or LF's) and the FAC=0.





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FLOATING OUTPUT

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DATE

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SOURCE LANGUAGE

PAL-10, VERSION 141

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